

WHAT IS CLAIMED IS:

- 1           1. A multicolor display comprising  
2           a substrate; and  
3           at least one multicolor generation site coupled to said substrate, each of  
4           said at least one multicolor generation sites comprised of:  
5           at least two light emitting regions proximate to one another; and  
6           at least one wavelength conversion layer applied to at least one of  
7           said at least two light emitting regions, wherein said at least two light emitting  
8           regions in combination with said at least one wavelength conversion layer emit at  
9           least two different colors.
- 1           2. A multicolor display comprising  
2           a substrate; and  
3           a multicolor generation site grown on said substrate comprising:  
4           at least two LEDs proximate to one another; and  
5           a first wavelength conversion layer applied to a light emitting  
6           surface of a first of said at least two LEDs, wherein said at least two LEDs in  
7           combination with said first wavelength conversion layer emit at least two different  
8           colors.
- 1           3. The multicolor display of claim 2, wherein said at least two LEDs  
2           are comprised of three individual LEDs proximate to one another.
- 1           4. The multicolor display of claim 3, further comprised of a second  
2           wavelength conversion layer applied to a light emitting surface of a second of said three  
3           individual LEDs, wherein said three individual LEDs in combination with said first and  
4           second wavelength conversion layers emit three different colors.
- 1           5. The multicolor display of claim 2, wherein said at least two LEDs  
2           emit light at a wavelength in the range of wavelengths between 4,000 and 4,912  
3           Angstroms.
- 1           6. A multicolor display comprising



2                   a substrate; and  
3                   a plurality of multicolor generation sites grown on said substrate, each of  
4    said plurality of multicolor generation sites comprised of:

5                   at least two LEDs proximate to one another; and  
6                   a wavelength conversion layer deposited on a light emitting surface  
7    of a first of said at least two LEDs, wherein said at least two LEDs in combination  
8    with said wavelength conversion layer emit at least two different colors.

1                   7.        The multicolor display of claim 6, further comprising an index  
2    matching layer interposed between said wavelength conversion layer and said light  
3    emitting surface of said first LED.

1                   8.        The multicolor display of claim 6, further comprising a protective  
2    layer deposited on an exterior surface of said wavelength conversion layer.

1                   9.        The multicolor display of claim 6, further comprising a protective  
2    layer deposited on a light emitting surface of a second of said at least two LEDs.

1                   10.      The multicolor display of claim 6, further comprising a region of  
2    opaque material deposited between said at least two LEDs.

1                   11.      The multicolor display of claim 6, wherein said substrate is  
2    selected from the group consisting of sapphire, silicon carbide and gallium nitride.

1                   12.      The multicolor display of claim 6, wherein said at least two LEDs  
2    emit light at a wavelength in the range of wavelengths between 4,000 and 4,912  
3    Angstroms.

1                   13.      The multicolor display of claim 6, further comprising a cross-talk  
2    minimization layer interposed between said substrate and said at least two LEDs.

1                   14.      The multicolor display of claim 13, wherein said cross-talk  
2    minimization layer is comprised of a Bragg reflector.

1                   15.      The multicolor display of claim 13, wherein said cross-talk  
2    minimization layer is comprised of a partially absorbing layer.

1                   16.      A multicolor display comprising

2 a substrate; and  
3 a plurality of multicolor generation sites grown on said substrate, each of  
4 said plurality of multicolor generation sites comprised of:

5 three LEDs proximate and immediately adjacent to one another;

6 a first wavelength conversion layer deposited on a light emitting  
7 surface of a first of said three LEDs; and

8 a second wavelength conversion layer deposited on a light emitting  
9 surface of a second of said three LEDs, wherein said three LEDs in combination  
10 with said first and second wavelength conversion layers emit three different  
11 wavelengths.

17. The multicolor display of claim 16, wherein said substrate is  
selected from the group consisting of sapphire, silicon carbide and gallium nitride.

18. The multicolor display of claim 16, wherein said first and second  
wavelength conversion layers are selected from the group of materials consisting of  
phosphors and active polymers.

19. The multicolor display of claim 16, wherein said three LEDs emit  
light at a wavelength in the range of wavelengths between 4,000 and 4,912 Angstroms.

20. The multicolor display of claim 16, wherein said first wavelength  
conversion layer converts light in a first wavelength range of between 4,000 and 4,912  
Angstroms to light in a second wavelength range of between 4,912 and 5,750 Angstroms.

21. The multicolor display of claim 16, wherein said second  
wavelength conversion layer converts light in a first wavelength range of between 4,000  
and 4,912 Angstroms to light in a second wavelength range of between 6,470 and 7,000  
Angstroms.

22. The multicolor display of claim 16, further comprising:  
a first index matching layer interposed between said first wavelength  
conversion layer and said light emitting surface of said first LED; and  
a second index matching layer interposed between said second wavelength  
conversion layer and said light emitting surface of said second LED.

1                   23. The multicolor display of claim 16, further comprising:  
2                   a first protective layer deposited on an exterior surface of said first  
3 wavelength conversion layer; and  
4                   a second protective layer deposited on an exterior surface of said second  
5 wavelength conversion layer.

1                   24. The multicolor display of claim 23, wherein said first and second  
2 protective layers are equivalent layers.

1                   25. The multicolor display of claim 23, further comprising a third  
2 protective layer deposited on a light emitting surface of a third of said three LEDs.

1                   26. The multicolor display of claim 16, further comprising a region of  
2 opaque material deposited between adjacent surfaces of said three LEDs.

1                   27. The multicolor display of claim 16, further comprising:  
2                   a plurality of channels within said substrate, said plurality of channels  
3 separating adjacent LEDs of said three LEDs; and  
4                   opaque material deposited within said plurality of channels.

1                   28. The multicolor display of claim 16, further comprising a cross-talk  
2 minimization layer interposed between said substrate and said at least two LEDs.

1                   29. The multicolor display of claim 28, wherein said cross-talk  
2 minimization layer is comprised of a Bragg reflector.

1                   30. The multicolor display of claim 28, wherein said cross-talk  
2 minimization layer is comprised of a partially absorbing layer.

1                   31. A method of fabricating an active, multicolor display, comprising  
2 the steps of:  
3                   defining a plurality of multicolor generation sites on a single substrate;  
4                   growing at least two LEDs on said substrate at each of said plurality of  
5 multicolor generation sites; and  
6                   depositing a wavelength conversion layer on a light emitting surface of at  
7 least one of said at least two LEDs at each of said plurality of multicolor generation sites.



1                   37. The method of claim 32, further comprising the step of interposing  
2 a cross-talk minimization layer between said substrate and said three LEDs at each of said  
3 plurality of multicolor generation sites.

1                   38. The method of claim 32, further comprising the step of interposing  
2 a distributed Bragg reflector between said substrate and said three LEDs at each of said  
3 plurality of multicolor generation sites.

1                   39. The method of claim 32, further comprising the step of selecting  
2 said first wavelength conversion layer to convert light in a first wavelength range of  
3 between 4,000 and 4,912 Angstroms to light in a second wavelength range of between  
4 4,912 and 5,750 Angstroms.

1                   40. The method of claim 32, further comprising the step of selecting  
2 said first wavelength conversion layer to convert light in a first wavelength range of  
3 between 4,000 and 4,912 Angstroms to light in a second wavelength range of between  
4 6,470 and 7,000 Angstroms.

100 99 98 97 96 95 94 93 92 91 90 89 88 87 86 85 84 83 82 81 80 79 78 77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1